[SE-03] Thermospheric Density Variations Caused by IMF Sector Polarity Changes

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Thermospheric density is important not only for predicting the atmospheric drag in the context of the satellite ephemeris prediction, but also in understanding the thermosphere-ionosphere coupling process as well. Thermospheric density variations are controlled by various sources such as Joule/particle heating, Lorentz force, thermal expansion, upwelling and horizontal wind circulation. These sources are directly or indirectly associated with the direction and/or strength of the interplanetary magnetic field (IMF). That is, there is an intimate relationship between IMF variation and thermospheric density variation. In 2003 and 2007 during the declining phase solar cycle 23, the IMF exhibited a well-defined sector polarity change; directed toward the Sun (i.e., +Bx and By) and away the Sun (-Bx and +By). It has been known that the IMF By in GSE coordinates makes a positive or negative IMF Bz offset in GSM coordinate. We discuss whether the thermospheric total mass density changes with the IMF sector polarity. For this study, we use total mass density around 400 km, derived from the high-accuracy accelerometer on board the CHAllenging Minisatellite Payload (CHAMP) spacecraft.

[SE-04] Statistical Analysis for Climatic Elements with the Solar North-South Asymmetry

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We show that the solar north-south asymmetry, the normalized difference between the northern and southern hemispheric sunspot area, could be a source of different statistical distributions of terrestrial climatic elements. For this purpose, we compare sliding correlation coefficients between sunspot numbers and earth's annual mean temperature anomalies with the solar north-south asymmetry, which is having larger values than zero from 1907 to 1985 and lower values than zero for the period before 1907 and after 1985. We also compare probability distributions of Northern Atlantic Oscillation (NAO) index in two different periods abovementioned. Temperature anomalies are shown to be negatively correlated with sunspot numbers when the southern solar hemisphere is more active, and vice versa. Probability distributions in two periods are different from each other.